

REMARKS

Claims 3, 4, 25-38, and 42-48 are pending in the present application.

The objection to Claims 5 and 25 is obviated by (a) cancellation of Claim 5 and (b) correction of Claim 25. Acknowledgment that this ground of objection has been withdrawn is requested.

The rejection of Claim 20 under 35 U.S.C. §112, second paragraph, is obviated by amendment. Claim 20 has been canceled herein. Acknowledgment that this ground of rejection has been withdrawn is requested.

The rejection of Claims 1-19 and 25-38 under 35 U.S.C. §112, second paragraph, is believed to be obviated by amendment.

Applicants have amended the claims to address the Examiner's several grounds of criticism. It is believed that the amendments herein render moot the Examiner's criticisms.

Acknowledgment that this ground of rejection has been withdrawn is requested.

The rejection of Claims 1, 8-12, 14, 15, 18 and 19 under 35 U.S.C. §102(e) over U.S. 6,291,763 (Nakamura), is obviated by amendment. Claims 1, 8-12, 14, 15, 18 and 19 are canceled herein. Acknowledgment that this ground of rejection has been withdrawn is requested.

The rejection of Claims 1, 2, 10, 14 and 15 under 35 U.S.C. §102(b) over Goossens et al. (1998), is obviated by amendment. Claims 1, 2, 10, 14 and 15 are canceled herein.

Acknowledgment that this ground of rejection has been withdrawn is requested.

The rejections of: (a) Claims 3, 29, 33, and 34 under 35 U.S.C. §102(b) over Goossens et al.; (b) Claims 4, 7, 8, 11, 26, 27, and 30 under 35 U.S.C. §103(a) over Goossens et al. in view of Yamamoto et al.; (c) Claims 8, 9, 11, 12, 18, 19, 27, 28, 30, 31, 37, and 38 under 35 U.S.C. §103(a) over Goossens et al. in view of Nakamura; (d) Claims 11-13, 17, 19, 30-32, 36, and 38 under 35 U.S.C. §103(a) over Goossens et al. in view of Saurer et al.; (e) Claims 5, 6, and 25 under 35 U.S.C. §103(a) over Goossens et al. in view of Yu et al. and either Saurer et al. or Nakamura; and (f) Claims 16 and 35 under 35 U.S.C. §103(a) over Goossens et al. in view of Han et al., is obviated in part by amendment and traversed in part.

Claims 1, 2, 5-24, and 39-41 have been canceled herein. Thus, to the extent that the Examiner rejects these claims, Applicants make no statement other than the rejections over these claims have been obviated.

With respect to the pending claims, Applicants submit that Goossens et al. disclose nanostructured anatase titanium dioxide (TiO₂) obtained by chemical vapor deposition having a fractal-type morphology (cf. abstract). Photovoltaic solar cells based on dye-sensitization of TiO₂ layers with such morphologies give reasonable efficiencies of 3% provided that the films are sufficiently thick, i.e., thicker than 30 μm (cf. page 113, left column, first sentence of the second paragraph). As explicitly discussed in Goossens et al., since the TiO₂ layers disclosed therein “do not consist of nanoparticles but are of nanostructured fractal type, a thicker film than those used by Grätzel’s group is necessary for the highest efficiencies... The optimal films thickness is found to be about 50 μm, which is about five times the optimum

thickness in the case of particulate electrodes. Nanostructured TiO₂ films composed of sintered particles have a poor mechanical stability when their thickness exceeds 50 μm” (cf. page 113, left column, second paragraph).

In contrast, the semiconducting oxide layer (SOL) of the present invention, wherein the semiconducting oxide preferably is TiO₂ (cf. Claim 34), consists of nanoparticles which are not of a nanostructured fractal type. Therefore, thickness of the layers is below the μm range. The thickness of the SOL, for example, preferably is about 5 to about 50 nm (cf. Claim 36). In one example, in which the configuration is “substrate + indium tin oxide/dye/TiO₂/Al”, the solar cell has a total thickness of < 100 nm (cf. page 8, third paragraph of the application as originally filed).

Thus, the subject-matter of independent Claim 3 is novel over Goossens et al.. Consequently, the subject-matter of Claims 29, 33 and 34, and also that of the remaining claims referring to Claim 3, are novel over Goossens et al., as well.

Since none of the other documents referred to in the examination report, i.e., U.S. 6,291,763 (Nakamura), U.S. 5,413,959 (Yamamoto et al.), U.S. 5,482,570 (Saurer et al.), U.S. 6,303,943 (Yu and Cao), and U.S. 6,043,428 (Han et al.), disclose vapor-deposition of an SOL, the subject-matter of independent Claim 3, and thus also that of the dependent claims, is novel over each of those documents. Further, these cited secondary references fail to compensate for the deficiencies in Goossens et al. and, thus, fail to render the present invention obvious.

More particularly, with respect to the alleged obviousness of the present invention, Applicants submit the following.

The object of the present invention is to provide a method for the production of a thin, high efficient hybrid solar cell, which can be produced on flexible substrates. This problem

is solved by a method for the production of a hybrid organic solar cell in which the SOL is introduced preferably by vapor deposition (cf. page 3, fifth and sixth paragraphs of the application as originally filed).

As already described above, Goossens et al disclose a solar cell, wherein the films must be thicker than 30 μm , preferably thicker than 50 μm (cf. page 113, left column, second paragraph). In contrast, the layers of the hybrid organic solar cell of the present invention are of a thickness below the μm range. Thus, the present invention provides for high efficiency in combination with the advantage of low thickness. Since none of the other documents referred to in the examination report discloses vapor-deposition of an SOL, the skilled person combining the disclosure of Goossens et al with that of any of the other documents would never arrive at the subject-matter of Claim 3.

Thus, the subject-matter of independent Claim 3 is novel and unobvious in view of Goossens et al in combination with any other of the cited secondary references. Therefore, the subject-matter of Claims 4 and 25-38, referring to Claim 3, involves are also novel and unobvious.

Withdrawal of these grounds of rejection is requested.

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Applicants submit that the present application is now in condition for allowance.
Early notification of such action is earnestly solicited.

Respectfully submitted,

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